UNIVERSITY OF ILORIN

THE TWO HUNDRED AND SIXTY-EIGHT (268TH) INAUGURAL LECTURE

"THE BEAUTY AND BEAST IN GENETIC DIVERSITY"

By

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DEPARTMENT OF ANIMAL PRODUCTION,
FACULTY OF AGRICULTURE,
UNIVERSITY OF ILORIN, NIGERIA

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Distinguished Invited guests,
My Lords, Spiritual and Temporal,
Gentlemen of Print and Electronic Media,
Great Students of the University of Ilorin,
Distinguished Ladies and Gentlemen.

Preamble

I stand before you today, 7th November, 2024 in all humility and reference to the Almighty God, the I am that I am, who beautifully and wonderfully created all things in their various kinds; to deliver the 268th inaugural lecture of this great University. I am privileged to deliver the 19th inaugural lecture from the Faculty of Agriculture, and the 6th from the Department of Animal Production. However, it is the first to be delivered by the first female Professor of Animal Production, University of Ilorin. I title this lecture "**The Beauty and Beast in Genetic Diversity"** to provide some insight into the peculiarities of genetic diversity, its influence on various traits exhibited as good or bad in poultry, and also enumerate my modest achievements despite several constraints I faced as an animal breeder and geneticist. This, I believe, will encourage young animal scientists towards the specialty for positive contributions to the production of animal protein for the teeming Nigerian population.

Introduction

It is important for me to define a few terms and concepts to make the discussion a comprehensible one. These terms are:

Genetics: This is the study of genes, patterns of trait inheritance, and how they are transmitted in living organisms from one generation to the next. The study of genetics is important because a gene is the unit of inheritance that carries information about our health, appearances, characters, and performances. It is the one that makes each unique (Griffiths *et al.*2000 & **Sola-Ojo, 2018**).

Diversity: This is a combination of the differences that make a population. It is the bewildering varieties of known forms, from the beautiful ones to the beastly types based on reproductive patterns, inherited traits, physical attributes, and cultural display. It is the beauty that leads to continuity of life.

Genetic Diversity: Genetic diversity is the total sum of the variation or differences that occur in living organisms and involves the total number of genetic characteristics in the genetic makeup of a species as well as the differences within and between species that are attributed to their span of survival. Various forms of diversity exist in species adaptive, behavioural, phenotypic, genotypic, and molecular markers.

Importance of Genetic Diversity

The followings are the importance of genetic diversity. Indeed, genetic diversity:

i. Describes the tendencies of genetic characteristics and genetic makeup of species as they vary from generation to generation;
ii. shows that variation exists between strains and breeds of the same species, and assists different populations to adapt to changing environmental conditions;
iii. enables the selection of superior genotypes that could be used for the development of good genetic stock, thus

leading to the production of genetically fit farm animals; and

iv. it is an important tool for the maintenance of biological diversity and evolutionary processes that will aid the preservation of original germplasm from going into extinction (National Biological Information Infrastructure, 2011).

Theories of Genetic Diversity

Genetic diversity theories are critical sites for intellectual and practical adaptation. These are:

Natural Theory of Evolution: This states that diversity is the result of the accumulation of neutral substitutions.

Diversifying Selection Theory: This stipulates that two subpopulations of a species live in different environments that select for different alleles at a particular locus.

Frequency-dependent Selection Theory: This theory hypothesises that as alleles become more common, they become more vulnerable.

History of Genetic Diversity

Diversity in the Holy Bible: In the book of Genesis, Chapter 1, verse 21-22, God created every living thing according to its kind. The different species that we see today show the potential variation that God designed within the original kinds. He created all kinds to reproduce within their boundary and produce offspring with considerable variation. The book of Ecclesiastes 3:11 affirmed that God created everything beautifully, while the book of Revelation, Chapter 19, verse 20 identified the beast in the physical forms represented at different ages which is a factor in phenotypic characterization and in different kingdoms; the highest taxonomic level in evolutionary lines. However, the original creations by the Almighty God are altered by genetic mutations and other processes such as natural selection, random genetic drift, migration, and random mating which eventually leads to great diversity in all living organisms.

Over time, geneticists have made use of variations in domesticated animals to enhance optimum production through selection and planned breeding programmes.

Diversity in Poultry: The poultry industry plays a vital role in meeting the growing demand for animal protein in Nigeria and indeed worldwide. Poultry are among the most diverse in the world and their species include chickens, guinea fowls, turkeys, muscovy ducks, quail, pigeons, peacocks, geese, ostriches, etc. Poultry have served man in various capacities as food, pets, aesthetics, means of livelihood, traditional medicines and cultural symbols since their initial domestication. Genetic diversity, which encompasses differences in phenotypic, biochemical, and molecular markers, plays a crucial role in the adaptation and productivity of different poultry species.

Phenotypic, Biochemical and Molecular Diversity in Poultry

Phenotypic traits refer to the observable characteristics or physical appearances that are inherited or phenocopied by individual. Phenotypic traits *are* identifiable as a result of the interaction between genotype and environment, while phenocopies are variation in phenotype caused by environmental conditions. The observed traits in poultry such as normal plumage and comb types, bright plumage colour, high body weight, egg production and feed efficiency, good feed conversion ratio, resistance to diseases, ability to withstand heat stress, good temperament are beautiful, while others such as weird appearances, rare plumage and comb types, dull plumage colour, low body weight, low egg production, low feed efficiency, poor feed conversion ratio, indiscriminate mating, poor hatchability and poor mothering ability, susceptibility to disease and heat stress, aggressiveness are beastly and non-attractive to farmers.

Biochemical diversity includes genetic variations in certain blood proteins such as heamoglobin, albumin, transferrin, carbonic anhydrase, etc. The polymorphisms in these proteins can be used to identify loci that affect the quantitative traits and

physiological functions of individuals, while molecular diversity investigates molecules concerning Deoxyribonucleic acid (DNA); a polymer that consists of two polynucleotides chains that coil around each other to form a double helix and carries genetic instruction for development, health, functioning, growth, reproduction, identities, culture, beauty and the beast of all living organism. Research on genetic diversity in poultry populations provides insight into inheritance, gene expression, and evolutionary history. The results are useful for planning poultry breeding programmes, improvement of the beast-like, and increasing the production of beautiful ones.

Vice-Chancellor sir, it is pertinent that I provide this background in genetic diversity which will lead to the:

1. Understanding of the basis of genetic diversity and confirm its influence on the contribution to the continuous production of animal protein; and
2. Identification of the need to encourage animal geneticists in Nigeria to explore, organise, and use diversity to establish beautiful lines within our local poultry population for optimum meat and egg production, and also for other valuable uses.

Mr. Vice-Chancellor, I embarked on a journey into the intricate world of studying diverse beautiful, and beastly traits in poultry through research into interaction between genotypes and environmental effects on the expression of any traits phenotypically, their evolutionary trends, and profound impact on food security using phenotypic, biochemical, and molecular markers.

How it all began: My Journey into the World of Academics

My enrolment into Baptist Day Primary School, Oko-Ogbomoso in Iresa-Adu Local Government Area (LGA), Oyo State at the age of four was influenced by my mother who was an auxiliary Nurse at Oko Maternity Centre. While First Baptist Church (FBC), Oko contributed significantly to my academic

performances, I had a good foundation of knowledge acquisition through various biblical activities and memorization, of which my favourite then was Proverb 6:6 (ìwé òwe orí ìkefà ese ìkefà) which says (To èèrun lo, ìwo òle: kíiyè sí ìse rè kí ìwo kío sìgbón); meaning Go to the Ant, thou sluggard, consider her way and be wise, I will get home and carefully observed how Ant operates as well as training at every stage of my early life as a member of Irawo, Girl Auxiliary 1 and 2, Lydia, Choir, Scripture Union, Sunday School and Baptist Student Fellowship where we were taught Godliness, diligence, integrity, hard work and the fear of God. The future of my academic journey was first predicted by a revivalist invited to FBC Oko by Rev. O.S. Abimbola who gave me a complete bible prize for stating his one-week revival topics offhand. He visited our house and told me never to compromise academic pursuits. The principal of my secondary school (Baptist Secondary Grammar School, Oko-Ogbomoso), Mr. G.O Fakorede was also a great mentor and a disciplinarian. The fear of Baba Fakorede's open lashes at the assembly ground for poor performances and any immoral act was the beginning of hard work and uprightness for students of Oko-Grammar School. In my final year in secondary school, I was appointed the school games prefect girl, although I was never into sports. This made me sad because I felt it would be a distraction for me and my academic goal, but I became more humbled and decided to make lemonade from lemon given to me. I took up the challenges and turned myself to a sport lover. I was able to excel as games prefect girl with the assistance of my three jolly friends Lasisi Afusat, Ismail Alimotu, and Lasisi Idayat I became fully engaged in sports by identifying my area of strength (short distance races and some field events) and succeeded with many medals won through continuous, consistent and constant practice. During the inter-house sports season, I used to acquire sports and other items to be sold for profit making and led my school female team to other schools for inter-house sports relay races. In 1991, I graduated as the overall best student and swept numerous prizes during the graduation

ceremony at FBC, Oko. To the glory of the Almighty God, I am the first female Professor from Baptist Secondary Grammar School Oko.

Vice-Chancellor sir, my journey to the university started with the help of my brother (Mr. Opawande Abayomi; Brother Yomi), who marveled at the amazing results I had in the West African Examination Council Senior School Certificate at first sitting from Oko Grammar School. He took me to Bariga Lagos to live with our elder brother (Mr. T. K Opawande; Baba Femi) who valued education and was ready to support. He enrolled me for extra lessons in a coaching center at Akoka where he taught as a University of Lagos student. I was frequently at the National Library Yaba for extra reading and interaction in preparation for GCE and JAMB. Brother Yomi tried his best to get me more acquainted with the academic environment and taught me how to read with country music all night. Many nights he slept hungry for me to be full; many times he carried my load from Bariga to Somolu and assisted me in fetching water so that I will be happy and comfortable. What a brother full of empathy! He insisted that "second class upper division" is the least dignifying grade I must earn from the university and taught me how to calculate the grade points. He also ensured that I attended academic programmes at the University of Lagos including inaugural lectures and at the end of the first inaugural lecture I attended at the then University of Lagos Main Auditorium, I fell in love with academics and prayed to be in academic environment.

My journey into the Faculty of Agriculture, University of Ilorin was designed by the Almighty God, and my sojourn in the academic profession was orchestrated by my husband (Prof. Olusola Johnson Ojo); while the choice of Animal Breeding and Genetics with an interest in molecular science was through the advice of my mentor; Prof. Kolade Luke Ayorinde. I used tandem technology to achieve my career dream through the selective blending of quantitative genetics, nutrigenomics, and evolution genomics, and I was able to unravel some influences of genetic diversity on beautiful and beastly traits in some

poultry species. My breakthrough in molecular studies started when the International Society of Animal Genetics (ISAG) identified my effort on diversity between four strains of 800 broiler chickens in the year 2019 and invited me and my MSc. Student (Ibiwoye Demilade) to the University of Lleida, Lleida in Spain for presentation of our research outcome (Figure 1).

Figure 1: Dr. Foluke Sola-Ojo, 1st from the right, Mr. Ibiwoye Demilade and Dr. Adeniyi Charles Adeola 3rd and 4th from the right in that order during the get together of participants at the 37th ISAG Conference, University of Lleida, Lleida, Spain on 11th July, 2019.

The lesson that I brought home was to start working on Nigerian poultry diversity and generate information for their conservation as 99% of animal geneticists from the developed world were busy on how to improve their native breed for better production. The task was huge, but I braced up to gain more knowledge in molecular science and bio-informatics through self-sponsored training (physical and virtual) as well as the personal acquisition of some basic equipment for hands-on training and laboratory analysis.

At the University of Lleida, Lleida, Spain immediately after the 37th ISAG conference, I enrolled with Gen-Z students to learn Metadata Validation and Submission. On getting back home to Nigeria, I registered for Hands-on Recombinant DNA Technology with the Molecular and Genetic Diversity Research Laboratory of the Fountain University, Osogbo, Osun State. Within the span of 2 years (2019-2021) with rigorous study, I got

trained virtually and earned certificate on Gene Editing, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), Comparative Transcriptomics with Bitesize Bio, United Kingdom. I also got certified in bioinformatics for biologists on Database and Resources, Linux, Sequence alignment theory and application, multiple sequence alignment, Genomics, Molecular Evolution and Phylogenetics, Next Generation Sequence and Technologies, Data Formats and Quality Control, Alignment to references, Ribonucleic acid (RNA)-Seq pathogen, Chip Seq Genome Assembly with H3 ABIONET of University of Cape Town, South Africa, as well as Bash Scripting, R-for data analysis and visualisation with Wellcome Connecting Science Future Learn.

My Contributions to Poultry Genetic Diversity

Vice-Chancellor sir, having provided some background that led me to teach and research in genetic diversity. Indeed, it is pertinent for me to state my contributions so far:

Diversity in Poultry Species Revealed Some Beauties and Beasts

In measuring poultry genetic diversity, data collection ranged from the differentiation of breeds according to phenotypic traits to studying the genotypes and evolutionary trends at the biochemical and molecular levels. Chickens' phenotypic diversity ranges from different feather and comb types as shown in Figure 2 (A-M) to inherited gene types that influence their beauty and beastly traits as listed in Table 1a & b.

Figure 2: (A-L). Diverse Beautiful and Beastly Feather and Comb Expression in Chickens and (**M**) some Fabulous rare feather chicken types worldwide.

Table 1a: Plumage Genes that influence the Expression of Beautiful and Beastly Traits in Poultry

S/N	Gene	Beautiful Traits	Beastly Traits
1	Na^+: Naked neck	Improved ability for convection and ability to withstand heat stress.	No feathers at the neck region,weird appearance with red coloured neck.
2	h: silky	Beautiful silky and bright feather, good looking with the ability to withstand heat stress.	Low production capacity for both meat and egg yield.
3	f: frizzle	Improved feed conversion rate and better meat yield.	Scattered feathers, weird appearances.
4	I:colour inhibitor	Heterozygote (Ii) carrier grow faster.	Homozygote (ii) individuals have a slower growth rate.
5	K:early feathering	Carriers have rapid growth rates and increased egg production.	Poor disease-resistant rate
6	k:slow feathering	Low feed requirement for optimum production.	The carrier will have delayed feathering which reduces protein requirement, and fat deposition.

Table 1b: Other types of Genes that influence the Expression of Beautiful and Beastly Traits in Poultry

S/N	Gene	Beautiful Traits	Beastly Traits
1	dw^+ sex-linked dwarfism	Improved fitness, disease tolerance, and low maintenance requirement.	Small body size, weird appearance. low meat yield and small egg sizes.
2	P: pea comb	More meatiness.	Carrier will have rough comb, weird appearances.
3	id:non-inhibitor	improved radiation ability from shanks and skin, dermal melanin deposition.	Black skin of dull appearance and Shank.
4	Fm:fibro melanosis	There is melanin deposition all over the body which protects the skin against UV radiation and improved pack cell volume as well as plasma protein.	Black Skin, dull and weird appearances.
5	B:B blood group(MHC)	Heterozygote carriers are heavier in body weight.	Homozygote carriers are lighter in body weight and attract low market value.
6	B^{21} allele	Carriers are resistant to Marek disease.	High Maintenance requirement.
7	B^9 allele	Low feed and maintenance requirements.	Carriers are Susceptible to Marek disease.
8	B^5 allele	Carrier have Immunity to coccidiosis caused by E tenelia.	High Maintenance requirement.
9	B^7 allele	Low feed and maintenance requirements.	Susceptibility to undifferentiated mortality and heat stress.
10	O blue shell	Improved egg shell stability.	There is deposition of blue pigment (biliverdin IX) into eggshell of the carrier making eggs not attractive

(Kallah and Nwagu, 1999 & **Sola-Ojo,** 2010)

My Research Work on Domesticated Chickens and Other Poultry Species

Uses of Different Poultry Species

In Nigeria, poultry and its products are of diverse use including consumption, beautification, aesthetic, companion, organic manure and pesticides, but most importantly local poultry species are valuable as indigenous ingredients for traditional medicine and paranormal/ voodoo procedures as shown in Table 2a & b (**Sola-Ojo** *et al.*, 2017c). The rate of uncontrolled usage of local poultry species is a factor that contributed immensely to their high demand at various markets, thus causing a rapid reduction in their population and leading to their extinction. Therefore, continuous production of all indigenous poultry types is urgently needed as this will increase their population and availability for all purpose.

Table 2a: Indigenous Uses of Chickens based on Different Phenotypes

S/N	Chicken Types	Local Name	Paranormal Ingredients
i.	Frizzle Feather	Asa/Adìre Ìrànà	Back to sender/Aróbi/; Network Sacrifice/Dàwá; Burial Sacrifice/ Ìrànà; Mercies/ Ėyónú
ii.	Silky Feather	Asa Olórò	Sacrifice for money making/ Ònà Olà; Provision/ Ìpèsè
iii.	Broken Feather	Òpìpì	Invisible action/ Afěěrí/ Egbé; Dispute causing in a peaceful setting / Ajàtúká
iv	White Feather	Adìre Fun fun	Honour Command/ Ọ̀wò/ Ěrù/ Respect Sacrifice/Ọ̀wò;Ease of things/Aremo/ Ëẏónú, Traditional bone Setting (Wópá, Wósè)
v.	Black Feather	Adìre Dúdú	Deliverance/Aseje irapada; Appease/ Aremo/ Eyonu
vi	Red Feather	Adìre pupa	Love and Attraction portion/ Òùnfà Ìfé

vii	Naked Neck	Abólórùn	Misled manipulation/Àsàsí; Mental disorder/Àrùn Opolo
viii.	Naked Body	Ológòngò	Mental disorder invoking/ Disgrace/ Ìdótújì/Èsín
ix.	Turtlehead Chickens	Olórí Adé	Protection/ Keep Silent/ Panumó.
x.	Other Comb Types	Onígba Ogbe	Popularity/ Blow / Orò Ajè/ Awó ërò/Òkìkí
xi.	Polydactly chickens	Oníkamárûn	Direction of path/ Àwárí; Guide/Atónà; Thief catcher/ Èmún Olé.

Table 2b: Indigenous Uses of other Poultry Species

S/N	Poultry Types	Local Yorùbá Names	Paranormal Ingredients
1	Duck	Pépéye/ Pàñgbá	Love portion/Ìfé, protection, back to sender/ Mádăríkàn, appeal to elder/ èbùré, and deliverance.
2	Guinea fowl	Awó/ Etù	Reunion, settlement, Ajé/ Money spinner/ritual and peace-making
3	Adult Pigeon	Eiye Ilé	Love portion, drawer of prosperity and fortunes; treatment of sender attack/ and ease of body peppering.
4	Bush Fowl	Àparò	For casting poverty spells and confusion.
4	Squabs (Baby Pigeons)	Ëjìgbèdè	For the learning of oracle path/ èjì ogbè, for memory re-gain, dementia treatment and crowd attraction (awórò) .
5	Ostrich Eggs/ Feather	Eyin/ Ìyé Òògòngò	For popularity and money ritual.
6	Peacock	Òkín	For enthronement, popularity (Òkìkí) and attraction.
7	Parrot	Ayékòótó	For identification of thieves, searching for lost items and messenger of intention.
8	Laughing Dove	Òdèrèkókò	As Messenger of peace and to send signals of intention.

N.B: The Head of Local poultry seller; Alhaji Abdulrahman Jamiu Adisa (Leader), his assistant (Mrs. Adama Yusuf), the Heads of Elewe-omo and Ibile (Abdulhakeem Usman, Abdulhakeem Ayinde and Mallam Oluwasina Galadima) of the Newmarket (Oja tun tun) Ilorin, Kwara State provided the information on Table 2a & b during our field work on poultry diversity and usage in October, 2019.

Poultry Diversity Study Sampling in Kwara State, Nigeria

Phenotypic and biochemical characterisation of available local poultry in Kwara state were carried out across the sixteen Local Government Area after I obtained all the necessary permissions. During the sampling period (Figure 3a & b), we were able to collect phenotypic data, and blood sample for biochemical and molecular analysis for different poultry species including Yoruba, Fulani, and Bororo ecotypes of chickens (*Gallus gallus domestica*) muscovy ducks (*Caraina moschata*), guinea fowls (*Numida meleagris*), turkeys (*Meleagris gallopavo*), quail (*Coturnix coturnix*), homing pigeons (*Columbia livia Domestica*), bush-fowls (*Francolinus francolinus*), laughing doves (*Streptopelia senegalensis*), ostriches (*Struthio camelus*), Geese (*Genus species*).

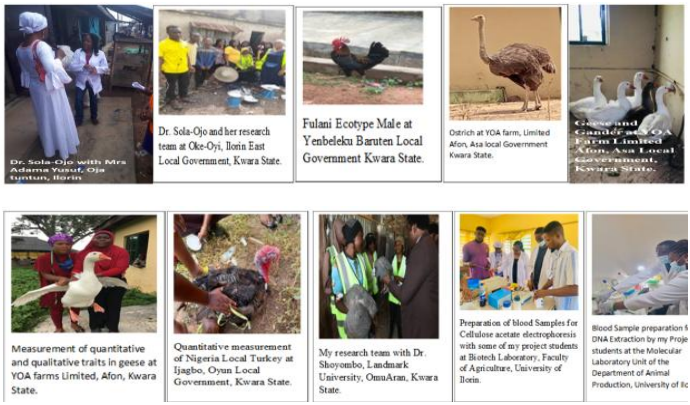

Figure 3a & b: Some Field and Laboratory works during the Poultry diversity research

To corroborate the high declining rate of valuable poultry kinds, I was able to get only one Naked chicken (popularly called Ológòngò among the Yorubas') in Kwara State, during diversity sampling. The usefulness of poultry among the Yoruba will not be complete if I fail to mention that Yoruba elders use poultry on daily basis as proverbs meant for instructions, warnings, prayers and eulogizing, through words of wisdom, talking drums and music. Some of these are as listed in Table 3a & b and the local poultry sellers are constantly appealing to poultry breeders and geneticists to save the rare types and produce more of their kinds for protection of their means of livelihood.

Table 3a: Some of the Yoruba Proverbs that depict the use of Chickens types for warnings and Instructions

S/N	**Òwe Yorùbă tó bá Adìe lo**	**Interpretation of the Proverb**
1	Adìre Iràǹà kii she ohun àjegbé	If you eat chickens slaughtered for someone's burial; one day yours will be eaten by others.
2	Adíre Funfun kò mo ara rè ní àgbà	White feathered chickens don't know it has a lot of respect as an adult.
3	Eyìn èyìn ni omo adìre ñto ìyá rè	Chicks usually walk behind their mother.
4	Bí adìre bá dà mí ní oògûn nù, màá fó ní eyìn	If Chicken pours my medicine away, I will break its egg.
5	Enití ógbé adìre òtòsì, ógbé ti aláròká	Whosoever steals the chicken of a poor man steal the property of a talk-about person.
6	Enìkan kìí gbé omo adìre sí abé gbin okà	No one carries chicks around to plant guinea corn.
7	Adìre pa ogún, ení adìre kò pa omo ire, Adìre pa ogbòn ení adìre kò pa omo ire, e gbé adìre dànù ewá kó owó ra awó, awó yé eyin métàlá ófi pa òkan soso, Òkan soso gíro gíro! (Nínú orin King Sunny Ade)	Chickens hatched twenty chicks, you were not delighted, chicken hatched thirty chicks, you were not pleased, you throw chicken away and use your money to buy guinea fowl, guinea fowl laid thirteen eggs, and hatch only one, just only one! (King Sunny Ade Song)

Table 3b: Some of the Yoruba proverbs that depict the use of other poultry species for warnings, instructions and prayers

S/N	*Òwe Yorùbă Fűn Ằwon Eiye Mĭràn*	Interpretation of the Proverb
1	Ằgbà ni etù, omodé ni awó	Helmeted guinea fowl is an adult, while non-helmeted are babies.
2	Pépéye bímo ó ràgà bo omo rè, ràgò bòwá elédùmarè títí di ojó alé (Orin Chief Ebenezer Obey)	Duck will always protect the ducklings, oh Lord protect us till the end (A song by Chief Ebenezer Obey)
3	Bí àsá se ñgbé omo adíye, kò lè gbé omo pépéye	The way eagles carry chicks for food it dare not duckling.
4	Enití o bá ñ retí àtisùn pépéye gbèsè aìì dí ni yí ò pa	Whosoever is expecting duck to sleep will die of unreasonable debt.
5	Ti òtún ti òsì, ni eyieilé fi ñkó ire wo ìlú	A pigeon will bring fortune to the town from left and right
6	Eiyeilé kìí bá onílé je, kí óbá onílé mun, tí ó bá di ojó ikú kí ye orí	Pigeon doesn't dine and wine with the keepers and betrays on the day of death.
7	Ằdàbà ñ pe ògèdè bí enipé eiyeilé kò gbó, eiyeilé gbó títiri lóñ tiri.''	Dove is making incantation as if pigeon did not hear, pigeon heard and was just pretending.
8	Aanu ni mori gba Adé orí òkín (Orin King Wasiu Ayinde) kì ún she ti eiyekéye	I am able to obtain mercy; The crown in peacock head (King Wasiu Ayinde Song) ……is not for any other birds.

Phenotypic Characterisation of the Beauty and Beastly Traits in Poultry

Phenotypic Evaluation Fulani Ecotype Chickens Traits

My research work began with the exploration of the Fulani Ecotype (FE) chickens, a dual purpose bird with a bigger body weight and native to the Fulani tribe of Northern Nigeria. The diversity in growth traits of the FE chickens was investigated and the results showed that FE consistently gained more in overall body weight and will respond positively to

selection between the ages of 13 to 16 weeks (**Sola-Ojo** & Ayorinde, 2009). Small percentages of occurrence of adaptive genes that influence the expression of beastly plumage and comb types were reported among the population of FE chickens raised intensively by **Sola-Ojo** *et al*. (2011b). Sexual dimorphism was reported to be distinct between 4-8 weeks of age in the FE chickens with male chicks having significantly higher body weight (**Sola-Ojo** *et al.,* 2011c**)**. **Sola-Ojo** *et al*. (2011d) asserted the proportion of egg weight that contributed to chick weight and subsequent body weight in FE chickens through the use of phenotypic correlation, and stated that egg weight is a reliable predicator of hatch weight and a useful marker for early performance selection criteria. It was reported that FE hens exhibited great diversity in body weight at first egg, age at sexual maturity, egg production, egg sizes, pause length, clutch sizes and egg quality traits **Sola-Ojo** *et al.* (2011e). Comparison of FE with Yoruba Ecotype (YE) chickens shows that FE chickens are significantly different from YE chickens with higher body weight and bigger egg weight of light cream or a tainted colour (**Sola-Ojo** *et al.,* 2013). Repeatability estimates revealed that FE chickens' body weight and eggshell quality are highly repeatable and need fewer records for genetic improvements. The wider diversity and high repeatability of the beautiful traits within the FE chickens suggests applications of appropriate selection procedures for their genetic improvement (**Sola-Ojo** *et al.,* 2014).

Reciprocal Crossing of the Fulani Ecotype Chickens with Exotic Strains

My Ph.D. research thesis, which was adjudged to be the best in the field of Agriculture in the Nigerian University system by the National University Commission in 2010, upgraded the FE chickens through reciprocal crossing with an exotic broiler (Hubbard Broilers Parent Stock, HB) and an exotic layer (Dominant Black Parent stock, DB). I was fortunate to obtain 200-day-old chicks (DOC) of DB parent stock, at no cost, from

the S and D Farm (Abeokuta, Ogun State) as a support for the research. Some of the key results obtained suggested that FE can be upgraded using the HB male line for meat production, and DB female line for egg production. Crossing of FE male X DB female produced an auto-sex offspring with different plumage colours inherited by male and female DOC. The male chick had a white spot on the head and 100% beautiful barred plumage at adult stage, while 95% of the females had pure beautiful black plumage, 5% had un-even beastly grey plumage (Figure 4). The study concluded that, there were diversity between the First filia (F_1) generation with better growth rate and egg production compared to the FE line. **Sola-Ojo** (2010), **Sola-Ojo** & Ayorinde (2010), **Sola-Ojo** *et al*. (2011a), **Sola-Ojo** *et al.* (2012) and **Sola-Ojo** (2018a).

Figure 4: A and B (Autosex FEXDB chicks); C and D (Adult FEXDB) genotypes first filial generations obtained from crossing Fulani Ecotypes chickens males with Dominant Black chickens females by (**Sola-Ojo**, 2010).

Phenotypic and Environmental Diversity Studies in other Poultry Species

My research into different poultry species with the use of some quantitative genetic tools covers species responses to different environmental conditions that affect the expression of beautiful phenotypic traits. A baseline comparison between

Nigerian Locals and Nicholas exotic turkeys was provided and, the beauty of resistance to disease was asserted among the Nigerian local turkeys, while their beastly traits were poor feed utilisation and conversion ratio that need breeders' urgent attention for improvement (**Sola-Ojo** *et al*., 2016a). A positive and significant correlation was found to exist between the growth traits of Nigerian local Turkey of different plumage with black male and lavender females having highest values for growth traits (**Sola-Ojo** *et al.* 2016b). Open field test was used to evaluate the gait score, fearfulness, latency-to-lie ratio, their associations with growth traits in local and exotic turkeys' genotypes, and we reported significant correlations and diversity in the behavioural traits between the two turkey genotypes studied (Fayeye, **Sola-Ojo**,… 2017a & Fayeye, **Sola-Ojo**… 2017b).

A statistical modelling for climate and incubation experiment was performed using the African Neural Network and multiple linear regression for hatchability of Japanese quail (*Cortunix cortunix Japonica)* eggs. The relationships between hatchability, environmental temperature and humidity were investigated using three thousand eight and fourteen (3,814) quail eggs, and this results revealed the need for optimisation of temperature and humidity for high hatchability (Adedibu, Abbaya, Yusuf & **Sola-Ojo**, 2017).

The feeding of diluted diets had negative effects on haematology, serum chemistry, growth traits and performance of exotic and improved local chickens, and poultry farmers were advised to desist from the act of diluting their birds feed (**Sola-Ojo** *et al*. 2018b and 2020a).

Effects of diet manipulation on Broiler chickens (BCs) performance were investigated using a graded level of Probiotics provided as a complimentary pack for research by Primalac^{R} Nigeria to enhance the use of *Moringa Oleifera* Seed Meal (PEMOSM) in chicken diet. The results showed the highest weight gain at a 4% inclusion level, and repeatability estimates of 0.62 for bodyweight of BCs fed PEMOSM. It emphasised that nutrition types play a major role as an environmental factor in

the growth traits of BCs (**Sola-Ojo** *et al.* 2017a, & b). There was a great diversity within and between body weight, performances and vital signs of four hundred (400) Broiler Chickens (BCs) of different strains (Ross 380, Marshall, Arbor Acre and Hubbard) studied under the same environmental and management conditions at starter as well as finishers phase, and I stated that BCs performance is genotypes dependent and should influence farmers' stocking decision for optimum profit (**Sola-Ojo** *et al.* 2020b), while different multivariate analysis revealed genotypes diversity of growth traits in different BC strains studied at the age of 28 days (Ibiwoye & **Sola-Ojo**, 2021). To further investigate the impact of tropical environment on different genotypes of BCs available in Nigeria, I designed and constructed a local heat chamber at the Fair n Firm Farm, Tanke, Oke-Odo, Ilorin, and used eight hundred (800) BCs of four genotypes (Arbor Acre, Ross 380, Hubbard and Marshall) to study the response of different strains of BCs to normal temperature, acute and persistent heat stress through different growth indices. There were diversities in parameters measured, and different abilities to withstand heat stress between the BCs used, those that can withstand heat stress were recommended for tropical climate (**Sola-Ojo** *et al*., 2019 & 2020c).

Phenotypic characterisation of indigenous Muscovy duck (MD) (*Cairina Moschat*a), was undertaken with two hundred (200) Kwara state MD using qualitative and quantitative traits, physiological parameters and blood profiles and there were diversities in all the parameters measured with sexual dimorphism between males and females (**Sola-Ojo** *et al.* 2020d). The homing pigeon (*Columbia livia Domestica*) was studied as an important animal genetic resource that is valued for its meat, eggs, aesthetic, and recreational purposes and, most importantly, for spiritual and ritual affairs in Nigeria (**Sola-Ojo** *et al.* 2017c). Our behavioural study on homing pigeons reported that they are social animals and spend 5 minutes for social gatherings, disperse for 7 minutes and gather again to search for food and eat together especially in the morning (Figure 5 a-d).

Figure 5a**:** Domestic Pigeons in Pen for Behavioural and Genetic Diversity Study at Fair and Firm Farm Tanke, Oke-Odo Ilorin (2019)**, b:** Measurements of body parameters in Homing pigeon, **c:** Early morning social gathering and feeding by a group of pigeons**, d:** Caressing and mating by a couple of pigeon.

We observed that males are more aggressive, caring and protective of their partners. Pigeons are the most distinct and faithful animal during courtship and mating; they mate for life. The male takes the leadership role during courtship, caressing, mating, circling, pair walking and flight take-off. Both partners are solely responsible for nest-making, feeding and caring for the young squabs through the provision of squab milk to baby pigeons either in the morning or in the evening. When one of the partners goes out to search for grains and insects for making the squab milk; the other watches over the squab by staying at least 1.26m from the nest and checking the squab at 3-minute intervals until the squab grows stronger with enough feathers to fly and start an independent life, this utmost care is necessary because in most cases pigeons lay, incubate and hatch only a pair of squab (a male and a female) called Ẹ̀jìgbèdè in Yoruba language (Hussein & **Sola-Ojo**…2021); a great lesson for humans to learn from this wonderful creature! In another study, we asserted significant diversity in the plumage and growth traits of adult homing pigeons (Abubakar, **Sola-Ojo**… 2020). Three nonlinear mathematical functions were used to analyse the body weight and growth curve in Egyptian Native geese (*Anser Anser Domesticus*), and we reported variability in the age-body weight relationship, with Von Bertanffy having the best growth-fitting curve model (Oguntunji, Amer, Widya, Putra, **Sola-Ojo**... 2023).

Biochemical Characterisation in Poultry

Study of diversity in biochemical parameters of poultry is important because the types of haemoglobin, transferrin, albumin and carbonyl anhydrase bands in their blood show how beautiful or beastly they are with respect to fitness and wellness in terms of better oxygen circulation, iron and molecule transportation, including catalytic reaction all of which can influence overall growth rate and production performances (Figure 6 a & b). There are limited information on the status of Nigerian poultry with respect to beautiful and beastly genotypes, and my findings are one of the landmark achievement that is fundamentals for continuous production and future development of poultry species.

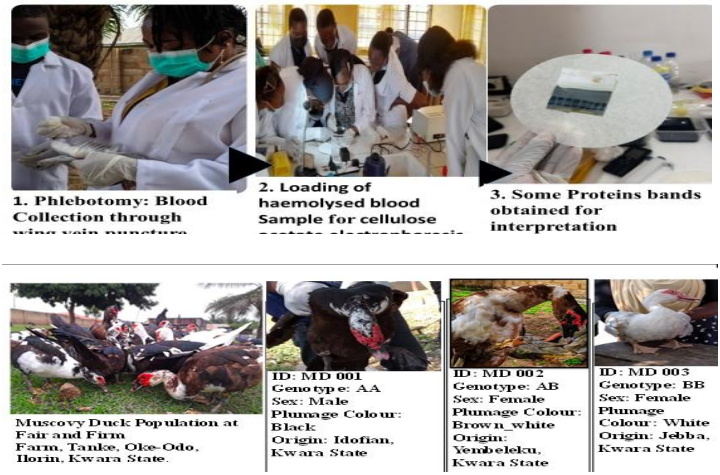

Figure 6a & b: Dr. Foluke Sola-Ojo taking her students through the process of blood collection, protein polymorphism bands determination and wing tagging of MD based on genotypes.

Blood Protein Polymorphism in Local Chickens and Muscovy Ducks

Biochemical characterization of haemoglobin types on one hundred and eleven (111) local chickens with different beautiful and beast-like feather types (normal, frizzle, silky and naked necks) sampled from Ilorin metropolis were performed through the use of cellulose acetate electrophoresis, and it was discovered that 24.33%, 43.24% and 32.43% of the local chickens had beautiful homozygotes HB^{AA}, heterozygotes Hb^{AB} and homozygotes Hb^{BB} genotypes, respectively (**Sola-Ojo** *et al.*, 2020e). In another study with thirty-four (34) Muscovy duck (MD) it was established that they differ biochemically with majority having heterozygotes Hb^{AB} genotypes (Oladiran & **Sola-Ojo**, 2021).

Molecular Characterisation and Evolutionary study of Nigerian Poultry species

Molecular markers are useful in molecular biology for identification of a particular sequence of DNA in a pool of unknown DNA, they are highly effective because of their ability to identify genetic linkage, mutations and changes between identifiable locations within a chromosome and the process involved can be repeated for verification. In our evolutionary studies we used the mitochondrial and nuclear markers. The mitochondrial genes are located in the mitochondrial and are the most important markers because they are passed exclusively from mother to a child through the egg cell, they are the power house of the cell (Siekevitz, 1957). Mitochondrial genes evolve faster, represent the strength of phylogenetics, and evolutionary biology; it also permits the tracing of the populations relationships. On the other hand, the nuclear genes are located in the cell nucleus of Eukaryotic organisms and they are inherited from father and mother. Human mitochondrial DNA was the first significant part of the human genome to be sequenced and the results revealed that human mitochondria DNA have 16,569 base pairs and encode 13 proteins (Anderson *et al.* 1981).

Molecular studies in some poultry types Chickens (*Gallus gallus Domestica*)

The diversity in evolutionary trends of the adult Nigerian chickens obtained from the Isin LGA of Kwara State were evaluated using 18S mitochondrial genes (Owolabi, **Sola-Ojo**…, 2023). The phylogenetic tree showed a close relationship of the same monophyletic clade between the Yoruba Ecotype Female and Exotic Broiler Female (Figure 7).

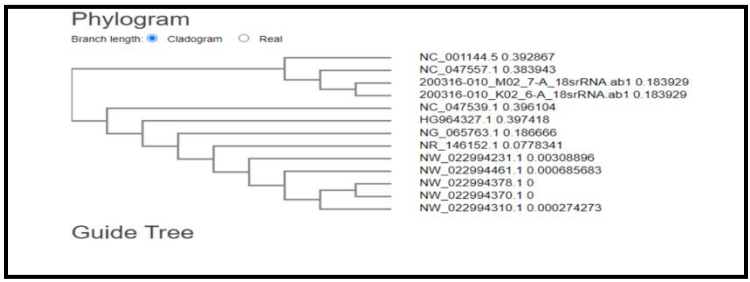

Figure 7: Phylogenetic relationship between chickens sampled in Isin Local Government Area of Kwara State, Nigeria.

Guinea fowl (*Numida Meleagris*)

Sexing of birds at an early age is very important for efficient selection and breeding, while taxonomic identification is relevant in the conservation of beautiful and beast-like genes for positive genetic gain. In Guinea fowl keets, sexing and sexual dimorphism is still very difficult. Therefore, **Sola-Ojo** *et al.* (2021a) embarked on molecular sexing of guinea fowl keets using agarose gel electrophoresis (Figure 8a and b). The genomic DNA of ten (10) guinea fowl keets were used to determine their sex via agarose gel electrophoresis and sequencing with chromo helicase DNA (CHD)-binding genes. A double band (ZW) and a single band (W) were viewed on agarose gel for female and males, respectively (Figure 8.0a), while 12S ribosomal RNA genes revealed that the Guinea fowl keets sequenced were evolutionarily related to other global *Numida meleagris.*

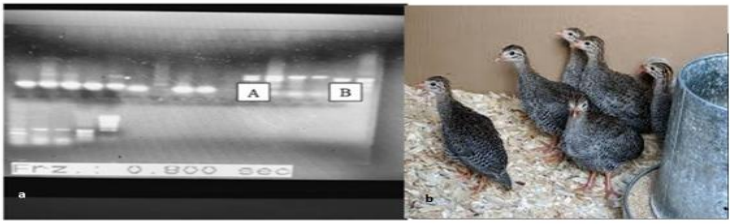

Figure 8a: Band Pattern of male and female guinea fowl as shown on Agarose gel; **b.** Young guinea fowl (Keets) with no sexual dimorphism phenotypically.

Muscovy Duck (*Caraina Moschata*)

My Muscovy Duck (MD) molecular evaluation started with a global collaborative study with Kunming Institute of Zoology, Chinese Academy of Science, China and this involve the use of two hundred and fifty-three (253) unrelated Nigerian village domestic Muscovy ducks from seven different populations, and 39 samples from two populations of China and India using mitochondrial Displacement loop gene (mtDNA D-loop). From the study, three hundred and eighty (380) sequences were obtained with fourteen (14) haplotypes of two novel sequences from Nigeria, and seven from India. It was concluded that high founders' effects and demographic relationships occurs among Nigerian MD population (Adeola, **Sola-Ojo**… 2020). Thirty-two (32) distinct haplotypes were obtained with a diversity of 79% through the use of nuclear Cytochrome P450 family 2, subfamily U polypetides 1 (CYP2U1) which indicate diverse paternal relationship in the population of MD studied (**Sola-Ojo** *et al.* (2021b). In another study, low genetic diversity was reported between Muscovy duck found in Ilesha Baruba, Yembeleku, Okuta and few from Bani (Kwara State), while the Jalview reveals some unique polymorphism with respects to the origin of the MD (Figure 9), and a close clustering pattern of the same

monophyletic clade were observed between some population, thus pointing towards maternal genetic intermixing which could have occurred from indiscriminate mating and inbreeding (**Sola-Ojo** *et al.*, 2021c).

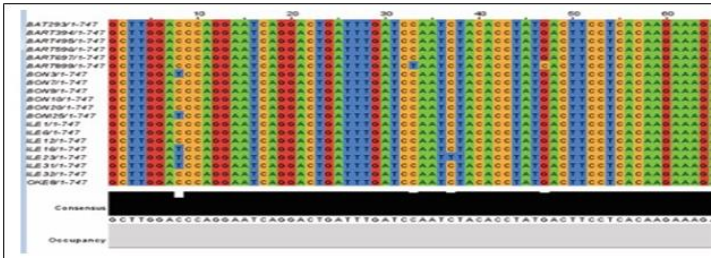

Figure 9: CYP2U1 Sequence of Muscovy Duck in Kwara State from 0 to 65 base pairs, with polymorphism in Baruteen, Bani and Ilesha Baruba Muscovy Duck.

The genetic diversity and polymorphisms between MD duck populations from four different States in Nigeria were also evaluated using the mitochondrial cytochrome b (Mt CYTB) genes, and the results revealed a total of 40 polymorphic sites consisting of 19 singleton variables with 42 mutations, 17 distinct haplotypes of 43.90% diversity which confirmed a low maternal genetic diversity within the MD from the study area (Yusuf, **Sola-Ojo**… 2024).

Domestic Pigeons (*Columbia livia Domestica*)

The first research on diversity for plumage inheritance in Nigerian domestic pigeons using the *Melanocortin* 1 receptor gene (MC1R) was from my team. My collaboration with scientists from the Kunming Institute of Zoology, and the Chinese Academy of Sciences on the association between plumage and MC1R gene polymorphism revealed variations in the plumage colour inheritance of Nigerian Domestic pigeons (Figure 10). There was a relationship between single nucleotide polymorphisms (SNPs) in MC1R and for distinctly beautiful plumage types (White, Spread, Ash-red, and Blue-bar) of 35

domestic pigeons from Nigeria, and 37 published MC1R sequences from France and Russia. Fourteen (14) SNP sites were obtained in 72 individuals sequenced with missense mutations occurrence in Nigerian Domestic Pigeons (Xiang-Xiang, Adeniyi, **Sola-Ojo**… 2023). We reported unique haplotypes, low genetic diversity, and population differentiation in Nigerian domestic pigeons using concatenated sequences of Mitochondria cytochrome oxidase subunit I, cytochrome b, and displacement loop gene (Abubakar & **Sola-Ojo** 2024).

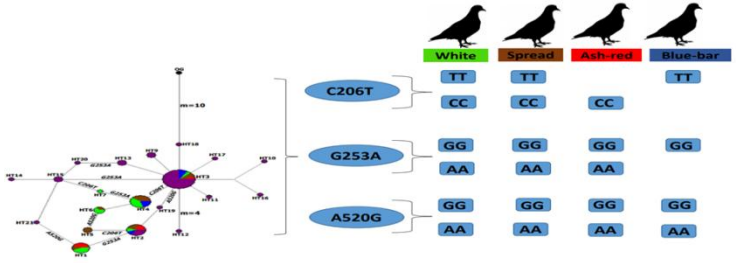

Figure 10: SNP sites and Network joining in Nigerian Domestic Pigeons using MC1R

Laughing Dove (LD) *Streptopelia Senegalensis*

The first report in Nigeria on genetic diversity of laughing dove (*Streptopelia Senegalensis*) popularly called òdèrékókò among the Yorubas was from my research team. LD are small birds with long tail and live in bushes of the Sub-Saharan regions of African continent, the middle East and Asia, especially India. In Nigeria, they are used for food, medicinal, religious and ritual purposes (Fig. 11a). The taxonomic order and diversity of Nigerian laughing doves (LD) based on the mitochondrial cytochrome oxidase subunit I (*COI*) and cytochrome B (*CYTB*) gene were investigated. The results showed unique 20 haplotypes within the Nigerian LD and other Global S*treptopelia* genus using the two molecular markers.

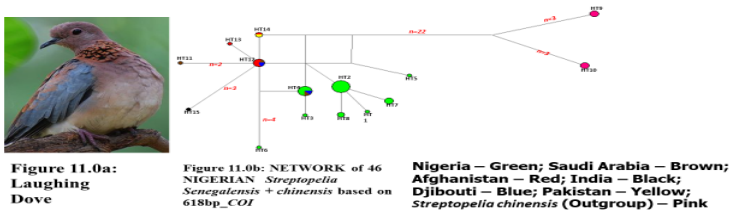

Figure 11: (a): Laughing dove; (b) Network joining of Nigerian LD with global Senegalensis sp

The phylogenetic tree obtained showed that Nigerian LD were in the same monophyletic clade with global *Streptopela orientalis, S. decocto* and *S. chinensis*; and this confirmed that Nigerian laughing doves have shared descendant with other *Streptopelia* species. The median-joining network obtained further grouped Nigerian LD into two: the first group consists of Nigerian populations only, while the second group is that of Saudi Arabian and Djiboutian populations (Fig. 11.0 b). Population expansion was revealed within the Nigerian LD individuals of 16 unique haplotypes and 74.3% diversity with nucleotide diversity of 0.154 for Mt *COI* marker. Most importantly Mt CYTB marker showed some clustering in the African LD, and the Nigerian LD and shared haplotypes with those from Sao Tome and Principe and the western equatorial coast of Central Africa. These findings are a strong indication of population expansion in laughing dove, and suggested further study so as to achieve adequate genetic improvement and domestication of laughing dove (**Sola-Ojo** *et al*., 2024).

My Contribution to Training

Undergraduate and Postgraduate Training

I had the privilege of teaching undergraduate students at the Department of Animal Production, University of Ilorin, and I have supervised over one hundred B. Agriculture and twenty-five postgraduate research projects. I designed a cardboard paper tag with a safety pin for chicks at the beginning of my Ph.D.

research work approved by Prof. K. L. Ayorinde when we could not get the imported one; this tag is still in use for chicks by our undergraduates today. I simplified 2,500 breeding and genetic terms in a book titled "The Colonies of Genetics and Breeding'' and in my laboratory and engaged my students in hands-on molecular training. Presently, I have graduated two Ph.D. students, and one is currently on his fieldwork exploring diversity in local Turkey. I am the country Liaison Manager for Animal Science Graduates Hatchery Schemes for PSA (USA).

Grants, Awards and Collaborations

I am a member of the research team that won the National Research Fund (NRF) grant 2022 for research on Nutritional Programming: A novel approach for tailoring fish performances with sustainable feeds. In 2021, I was granted a 20% discount on reagents and services provided by Pacific Biosciences under Single Molecule Real-time Sequencing grant Program for Estimation of Expression of IgF-1 and HSP (70) gene in Fulani Ecotype Chickens, and I was among the honoured finalists that were connected to the Illumina team (USA) under the Illumina Agricultural Greater Good Initiative Grant programme for a study on freshwater fish diversity along with Rodrigo Cano, SENAI CETIQT-Brazil, Victor Pylro, Federal University of Lavras-Brazil, Christine Picard, Indiana University Purdue University Indianapolis, NSF Center for Environmental Sustainability through Insect Farming-United States, Claudia Villicaña, Research Center for Food and Development-Mexico and Gregor Gorjanc-University of Edinburgh, The Roslin Institute - United Kingdom.

I was awarded a full travel grant to the Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden in March 2019 for the AgriFoSe 2030 program of UN Sustainable Development Goal and the 7th All Africa Conference on Animal Agriculture organised by All Africa Society for Animal Production at the International Conference Centre Accra, Ghana in August, 2019. I also had a support grant to attend the African

Women in Agricultural Research and Development AWARD @ 10 at the Trademark Hotel Nairobi, Kenya, in November 2018 and the University of Lleida, Lleida, Spain for the 37th ISAG conference, July 2019 where I presented "Advancing livestock genomics education" by Prof. Edward J. Smith of Virginia Tech. University (USA), and learned Hands-on Metadata Validation and Submission. I was sponsored by the Presidential Livestock Reforms Implementation committee to participate in the stakeholder consultative workshop on livestock reforms in Nigeria, at the state house banquet hall, presidential Villa, Abuja between October 24th to 26th 2024.

My Ph.D. thesis won the prestigious National award as the best Ph.D. thesis in the discipline of Agriculture for the year 2010 under the Nigerian Universities Doctoral Award Schemes (NUDTAS) by the National University Commission (NUC) and I coordinated the NUDTAS Supervisor Grant award by the University of Ilorin given to Prof. K. L. Ayorinde in 2014, while two Master's degree students served as beneficiaries and worked on the Evaluation of the Nigerian Local Turkey cross-bred for Meat and Egg production.

I have an international collaboration with the Sino-Africa Joint Research Center (SAJOREC) which is a talent cultivation and scientific research institute supported by the Chinese government based on the exchange of official letters between the Chinese government and the Kenyan government. The headquarters of SAJOREC is located at Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya, and the host institutes are Wuhan Botanical Garden of Chinese Academy of Science (WBG, CAS) and JKUAT, respectively as the Animal Branch of the Germplasm Bank of Wild species, and the Chinese Academy of Sciences Large Research Infrastructure Funding through Dr. Adeola Charles Adeniyi. My research team benefitted from Chinese Academy of Sciences President's International Fellowship Initiative support grant (2021FYB0006) that supported three Ph.D. research efforts in Nigerian Poultry diversity from the Department of Animal Production, University of Ilorin.

Livestock Farm Consultancy

The experience I gathered on feed formulation and diet production at Feed Masters Limited where I rose to the post of Plant Manager before joining the University of Ilorin enabled me to contribute to the establishment, development, and production of animal protein through consultancy services. I have provided major consultancy services to Shonga Farm Holdings, Shonga, Ikun Dairy (Ikun-Ekiti), and YOA Farms Limited Afon, Kwara State, and also for other farm owners in Nigeria.

Other Services to the University and Community

In August 2023, I was appointed Ag. Head of Department (Animal Production), and I am still serving in this capacity as a substantive Head of Department. I have served as a member of the University Stem Cell Committee, the Lead Coordinator of the African Support Bureau for Entrepreneurship (ASBE). I was appointed to serve as a JUPEB National Chief Examiner and Supervisor in 2021 and 2023. Presently, I am a member of the University of Ilorin Committee on Developing and Implementing Innovative Entrepreneurship Certification (UDIIEC) that birthed U-INSPIRE, and the Chairperson of the Technical Sub-committee of UDIIEC. I am serving as a member of the Molecular Diagnostic and Research Laboratory; the Investment in Digital and Creative Enterprises (IDICE) Proposal Development Committee; the Implementation Committee on China-Africa Higher Education Cooperation and Development in the Digital Age Conference; Joint University Preliminary Examination Board (JUPEB) member at the University of Ilorin. At the National level I am a member of the Technical Committee of the Food and Agricultural Group of the Standard Organisation of Nigeria, SON. Internationally, I am the coordinator of ASBE and a member of the Standing Committee on Applied Genetics and Genomics in other Species of Economic Interest of the International Society of Animal Genetics (ISAG), and I am serving as an adjunct lecturer and external examiner for undergraduate and postgraduate studies in other institutions as well as reviewers of some Journals in the field of Animal Science globally.

At the Faculty level, I have served as a Clearance Officer, Level Adviser; Chairperson of the Faculty Ethical Review, Faculty Business and Biotechnology and Molecular Science Working Committee, Faculty Representative on the Board of Engineering and Technology, Technical and Entrepreneurship Centre, and BATN Agriprenuership Grant Coordinator. My interest in sports was spurred by NAAS, and we organised the first Faculty of Agriculture final-year students inter-house sports with the Elegantee Set of 2022/2023 in May 2024. At the Departmental Level, I have served as an Examination Officer and Postgraduate Coordinator. Chairperson of the Welfare and Laboratory Committee, Secretary of the Technical Committee on the CBN Tertiary Institution Poultry Revival Scheme (TIPRES), and a member of the Sub-committee that named the University of Ilorin *Gallus gallus Domesticus* Max Farm (Unilorin GgMax Farm). At the community level, I have served as Chairperson of the Animal Science Association, Kwara State Chapter. Vice-President, University of Ilorin Pacesetters Cooperative Society and Parent Teachers Association Flora Schools, as well as Financial Secretary, Ikole LGA Ifelere group in Ilorin, Kwara State.

Membership in Professional Bodies

I am a member of the International Society for Animal Genetics (ISAG), and a standing Committee member on Applied Genetics and Genomics in other Species of Economic Interest for the society. I am also a member of the Nigerian Institute of Animal Science (NIAS), Genetic Society of Nigeria (GSN), Animal Science Association of Nigeria (ASAN), Nigerian Society for Animal Production (NSAP), Poultry Science Association (PSA) and World Poultry Science Association (WPSA)- Nigeria Branch and Nigerian Women in Agricultural Research for Development (NiWARD).

Conclusion

Mr. Vice-Chancellor, distinguished ladies and gentlemen, having enumerated the wide scope contained in the field of genetic diversity study, I would like to start this conclusion by stating that understanding genetic diversity in living things should make us accept all kinds as a creation of the Almighty God for a specific purpose. The phenotypic character/traits exhibited by one are both in a beautiful or beast-like form and inside every beautiful being there are beastly traits and vice-versa. As a geneticist, I have come to understand that most of these traits/characters are genetically rooted, traceable evolutionarily, imprinted molecularly, or phenocopied to be displayed by individuals carrying it. Individuals with beautiful or beastly genes have the tendency to produce offspring that will bear the same alleles and their genes will be represented in the next generation all things being equal. Negative selection and the influence of the environment can reduce the population and expression of the beastly traits, while breeders' choice and desire for positive and good traits will keep increasing the population of the beautiful ones from generation to generation.

In the entire genomes of humans with approximately 3 billion bases and about 23,000 genes on 23 pairs of chromosomes, traits/ characters vary within and between species, breeds, strains and families. Thus, most time it is good to take a deep breath at the display of any traits, pause, and accept it as the creation of the Almighty God. While embracing the beautiful one, we should strive to bring out the best from the beastly types, we should note that the beauty of empowering others can never diminish our power but add value to us. Empowerment can suppress the beast in many and bring out the beauty in them for the benefit of mankind. Let us therefore accept the diversity of nature for peace, and make the world a beautiful place to live.

My research has contributed the following to poultry production:

i. Upgrading of Fulani Ecotype chickens with exotic Dominant Black strains led to the emergency of beautiful auto-sex chicks with better performance in egg production than the local parent through the FE male lines (FEXDB), while reciprocal crossing of FE with the exotic Hubbard broiler strains produced offspring with higher bodyweight than FE from both lines.

ii. Reports of environmental effects on phenotypic and biochemical parameters within and between different strains of available exotic broiler chickens and other Nigerian local poultry.

iii. Characterisation of some local poultry species through the use of phenotypic, biochemical, and molecular markers; and confirmation of small availability of local poultry population with rare/beastly phenotypes as well as those with beautiful genotypes.

iv. Discovery of low genetic diversity, pan mixes, founder effects, mutations, and evolutionary relationships in the population of some Nigerian local poultry species and their global counterparts.

v. Contribution to data that will assist breeders and geneticists in conservation, management, development of new lines of poultry, and enhancement of animal protein production for the teeming population.

Recommendations

The Vice-Chancellor, I want to make the following recommendations:

1. Improving Nigerian poultry ecotypes should be a top priority. Poultry breeders should prevent those with beastly/ rare plumage and comb types from extinction by producing more of their types, as all poultry types are useful either as animal protein or valuable as paranormal ingredients for religion, ritual, cultural and traditional medicines purposes. Thus, urgent conservation of their germplasm is necessary for the next generation.
2. Nigerian Poultry Genetic Conservation is endangered and there is a need to take it beyond academic exercise with a strong database for their genetic resources. Animal breeders and Geneticists should be committed to preserving local chicken germplasms and focus on studies that will enhance their preservation and improvements.
3. There is a need for population expansion of Nigerian local/indigenous poultry species, this will enable selective mating, reduce inbreeding, and increase heterozygosity of beautiful genotypes among Nigerian poultry populations.
4. The effort of poultry breeders and geneticists should be directed towards increasing the population of the beautiful ones (phenotypes and genotypes) through intensive identification and practice of selective mating for better future gene representation.
5. Adequate funding for research and training in molecular studies should be made available for animal geneticists in Nigeria for meaningful research of global standards.
6. The Leo van de Mireop Molecular and Biotechnology Laboratory of the Faculty of Agriculture, University of Ilorin, should be considered for positive contributions to molecular research in Nigeria.

Acknowledgements

Adoration and all glory to the Almighty God who has kept me by His mercies and made this day a reality. I will never be more loved than I am right now; Dearest Father, there is nothing I can do to let you down as it does not take a trophy to make you proud. I have been through storms in this life but you did not let me down; you would cross an ocean for me not to get drowned, **Jehovah JIREH** you are enough! (Adapted from Maverick City Jireh Lyrics). When the going was very tough for me, God sent an angel as a beacon of light to my path for the right direction, the angel declared Your lifting words that beautify my inner self and illuminate more of Your glory for me to carry on and be strong, thank you, father!

Mr. Vice-Chancellor, my help has always been from the hill which the Almighty God have set above me (Psalm 121). I humbly appreciate everyone that He set on the hill for me, and I always look up to them and learn from the best. I thank the University Authority for the honour bestowed upon me in appointing me as a Professor and as the Head, of the Department of Animal Production, University of Ilorin. Many thanks to the University Administration under the leadership of Prof. Ishaq Olanrewaju Oloyede for appointing me as a lecturer, and Prof. Wahab Olasupo Egbewole, SAN for pronouncing me as a Professor. For the opportunity to present this inaugural lecture and the enabling environment that supported my growth, I appreciate the University Management team (The Deputy Vice-Chancellors: Academics (Prof. O. A. Omotesho); Management Services (Prof. S. F. Ambali), Research, Technology and Innovation (Prof. A. A. Fawole), and also the Chairman Library and Publications Committee (Prof. A.A. Adeoye) for his moral support and for editing of this inaugural lecture.

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